UNITED STATES DISTRICT COURT
WESTERN DISTRICT OF TEXAS
WACO DIVISION

PARKERVISION, INC., Plaintiff, v. **INTEL CORPORATION,** Defendant.	**Case No. 6:20-cv-00108** **JURY TRIAL DEMANDED**

COMPLAINT FOR PATENT INFRINGEMENT

Plaintiff ParkerVision, Inc. ("ParkerVision"), by and through its counsel, files this Complaint against Defendant Intel Corporation ("Intel") for patent infringement of United States Patent Nos. 6,049,706; 6,580,902; 7,110,444; 7,539,474; 8,588,725; 8,660,513; 9,246,736 and 9,444,673 (the "patents-in-suit") (Exhibits 1-8) and alleges as follows:

NATURE OF THE ACTION

1. This is an action for patent infringement arising under the patent laws of the United States, 35 U.S.C. §§ 1 *et seq*.

PARTIES

2. Plaintiff ParkerVision is a Florida corporation with its principal place of business at 9446 Philips Highway, Jacksonville, Florida 32256.

3. On information and belief, Defendant Intel is a Delaware corporation with a place of business at 2200 Mission College Boulevard, Santa Clara, California 95054.

4. On information and belief, Intel has places of business in this judicial district: 1300 S Mopac Expressway, Austin, Texas 78746; 6500 River Place Blvd, Bldg 7, Austin, Texas 78730 and 5113 Southwest Parkway, Austin, Texas 78735 (collectively, "Austin Offices"). https://www.intel.com/content/www/us/en/location/usa.html.

5. Intel can be served with process through its registered agent for service in Texas: CT Corporation System, 1999 Bryan Street, Suite 900, Dallas, Texas 75201.

6. On information and belief, since April 1989, Intel has been registered to do business in the State of Texas under Texas Taxpayer Number 19416727436.

JURISDICTION AND VENUE

7. This Court has jurisdiction over the subject matter of this action pursuant to 28 U.S.C. §§ 1331 and 1338(a) because the action arises under the patent laws of the United States, 35 U.S.C. §§ 1 *et seq*.

8. Venue is proper in this judicial district pursuant to 28 U.S.C. §§ 1391(b), (c), (d) and/or 1400(b).

9. Intel is subject to this Court's personal jurisdiction, in accordance with due process and/or the Texas Long Arm Statute because Intel "[r]ecruits Texas residents, directly or through an intermediary located in this state, for employment inside or outside this state." *See* Tex. Civ. Prac. & Rem. Code § 17.042.

10. This Court has personal jurisdiction over Intel because Intel has sufficient minimum contacts with this forum as a result of business conducted within the State of Texas and this judicial district. In particular, this Court has personal jurisdiction over Intel because, *inter alia*, Intel, on information and belief: (1) has substantial, continuous,

and systematic business contacts in this judicial district; (2) owns, manages and operates facilities in this judicial district; (3) enjoys substantial income from its operations in this judicial district, and (4) employs Texas residents in this judicial district.

11. Intel has purposefully availed itself of the privileges of conducting business within this judicial district; has established sufficient minimum contacts with this judicial district such that it should reasonably and fairly anticipate being hauled into court in this judicial district; has purposefully directed activities at residents of this judicial district; and at least a portion of the patent infringement claims alleged in this Complaint arise out of or are related to one or more of the foregoing activities.

12. This Court also has personal jurisdiction over Intel because Intel, directly and/or through its subsidiaries, affiliates, or intermediaries, makes, uses, offers for sale, sells, imports, advertises, makes available and/or markets infringing products in the United States, the State of Texas and/or this judicial district, as described more particularly below.

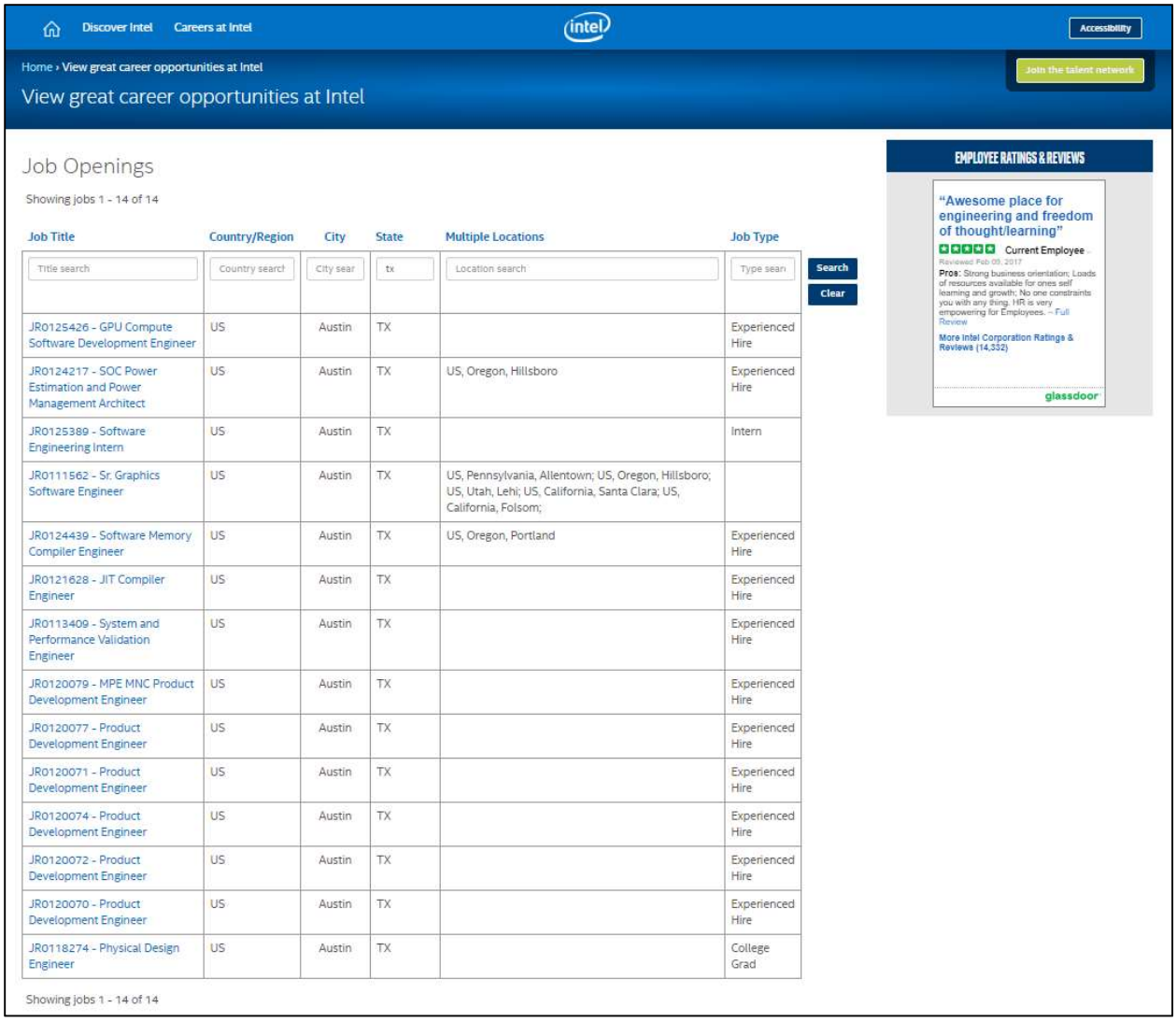
13. On information and belief, Intel maintains a significant physical presence in this judicial district.

14. On information and belief, Intel uses its Austin Offices as a regular and established place of business. On information and belief, Intel has employed over 1700 current and former employees in the Austin area. https://www.linkedin.com/company/intel-corporation/people/?facetGeoRegion=us%3A64.

15. Intel describes its operations in Austin on its website: "Located in the capitol city of Texas, Intel Austin is an important research and development center for the Intel technology that is changing the way we live, work, and play. Among the innovations developed in Austin are core technologies for next-generation microprocessors, platforms and base software; groundbreaking silicon solutions for computing and communications devices, which include handheld computing and cellular communications; and cutting-edge network storage products." https://www.intel.com/content/www/us/en/jobs/locations/united-states/sites/austin.html.

16. On information and belief, Intel has hundreds of H-1B labor condition applications for people employed in Austin, Texas. https://h1bsalary.online/search?searchtext=INTEL+CORPORATION&year=&minsalary=&state=&worksite_city=AUSTIN&job_title=. Employees holding an H-1B visa are employed in a specialty occupation that requires "theoretical and practical application of a body of highly specialized knowledge . . . and attainment of a bachelor's or higher degree in the specific specialty." *See generally* 8 U.S.C. § 1184. As such, Intel employees in Austin, Texas are highly specialized and important to the operation of Intel.

17. Intel lists job openings on its website for positions in Austin, Texas.



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JR0124217 - SOC Power Estimation and Power Management Architect	US	Austin	TX	US, Oregon, Hillsboro	Experienced Hire
JR0125389 - Software Engineering Intern	US	Austin	TX		Intern
JR0111562 - Sr. Graphics Software Engineer	US	Austin	TX	US, Pennsylvania, Allentown; US, Oregon, Hillsboro; US, Utah, Lehi; US, California, Santa Clara; US, California, Folsom;	
JR0124439 - Software Memory Compiler Engineer	US	Austin	TX	US, Oregon, Portland	Experienced Hire
JR0121628 - JIT Compiler Engineer	US	Austin	TX		Experienced Hire
JR0113409 - System and Performance Validation Engineer	US	Austin	TX		Experienced Hire
JR0120079 - MPE MNC Product Development Engineer	US	Austin	TX		Experienced Hire
JR0120077 - Product Development Engineer	US	Austin	TX		Experienced Hire
JR0120071 - Product Development Engineer	US	Austin	TX		Experienced Hire
JR0120074 - Product Development Engineer	US	Austin	TX		Experienced Hire
JR0120072 - Product Development Engineer	US	Austin	TX		Experienced Hire
JR0120070 - Product Development Engineer	US	Austin	TX		Experienced Hire
JR0118274 - Physical Design Engineer	US	Austin	TX		College Grad

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https://jobs.intel.com/ListJobs/All/Search/state/tx/ (visited on 1/7/2020).

18. On information and belief, Intel has litigated/is litigating cases before this Court in which it admitted that venue was proper, did not contest personal jurisdiction, and/or filed counterclaims. *See, e.g.*, *Flash-Control, LLC v. Intel Corp.*, Case No. 1:19-cv-01107 (W.D. Tex.); *VLSI Tech. LLC v. Intel Corp.*, Case No. 1:19-cv-00977 (W.D. Tex.).

BACKGROUND

19. In 1989, Jeff Parker and David Sorrells started ParkerVision in Jacksonville, Florida. Through the mid-1990s, ParkerVision focused on developing

commercial video cameras, e.g., for television broadcasts. The cameras used radio frequency (RF) technology to automatically track the camera's subject.

20. When developing consumer video cameras, however, ParkerVision, encountered a problem – the power and battery requirements for RF communications made a cost effective, consumer-sized product impractical. So, Mr. Sorrels and ParkerVision's engineering team began researching ways to solve this problem.

21. At the time, a decade's-old RF technology called super-heterodyne dominated the consumer products industry. But this technology was not without its own problems – the circuity was large and required significant power.

22. From 1995 through 1998, ParkerVision engineers developed an innovative method of RF direct conversion by a process of sampling a RF carrier signal and transferring energy to create a down-converted baseband signal.

23. After creating prototype chips and conducting tests, ParkerVision soon realized that its technology led to improved RF receiver performance, lower power consumption, reduced size and integration benefits. In other words, RF receivers could be built smaller, cheaper and with greater improved performance.

24. ParkerVision's innovations did not stop there. ParkerVision went on to develop additional RF down-conversion technologies, RF up-conversion technologies and other related direct-conversion technologies. ParkerVision also developed complementary wireless communications technologies that involved interactions, processes, and controls between the baseband processor and the transceiver, which improved and enhanced the operation of transceivers that incorporate ParkerVision's

down-converter and up-converter technologies. To date, ParkerVision has been granted over 200 patents related to its innovations including, the patents-in-suit.

25. After spending millions of dollars developing RF technologies, ParkerVision sought to partner with larger, well-established companies who could use ParkerVision's innovations to manufacture highly integrated circuits on a large scale for the consumer market. In the late 1990s, ParkerVision began meeting with companies such as Qualcomm, an industry leader in RF chip technology.

26. Qualcomm quickly recognized the significance of ParkerVision's direct-conversion technology. In internal communications, Qualcomm engineers and senior executives lauded ParkerVision's technology: "This is virtually the holy grail of RF receiver designs –- achievable and within practical limits!"; "[w]e are very impressed with the performance! We can make a phone with [ParkerVision's] parts with higher dynamic range than today's phones" and "[t]he truth is Parker Vision have [sic] stumbled on something revolutionary." After testing ParkerVision's technology, a Qualcomm senior executive and former engineer stated "[t]o tell you the truth, I am more of a believer now than when I started talking with [ParkerVision]" and Qualcomm's then-division President stated "this is critical technology that we must land based on what we have seen so far. It offers revolutionary rf versus power performa[n]ce based on early te[s]t resul[t]s."

27. Qualcomm and ParkerVision never entered into an agreement.

28. Then, in the mid-2000s, with the rise in popularity of smartphones, there became a critical need for smaller, more efficient receivers capable of supporting multiple frequency bands. ParkerVision's technology addressed this need.

29. In 2011, a ParkerVision engineer found a Qualcomm conference paper describing Qualcomm's then-current RF technology. The technology was strikingly similar to the technology that ParkerVision disclosed to Qualcomm years earlier. Through reverse engineering of Qualcomm's RF chips, ParkerVision confirmed that Qualcomm had been using ParkerVision's patented technology. And, Qualcomm has enjoyed great financial success by doing so. ParkerVision sued Qualcomm and its customers for patent infringement and has been locked in litigation ever since.

30. The damage to ParkerVision, however, was already done. On information and belief, seeing Qualcomm's success, other chip manufacturers such as Intel shifted to using ParkerVision's technology. This shift in the industry ultimately led to the abandonment of super-heterodyne technology.

31. ParkerVision's technology helped make today's mobile devices, such as smart phones and tablets, a reality by enabling RF chips used in these devices to be smaller, cheaper, and more efficient, and with higher performance.

INTEL CHIPS

32. Until recently, Intel (or those acting on its behalf) made, used, sold, offered to sell and/or imported RF transceiver chips/modems, for example, for use in smartphones. These chips include, without limitation, the Intel PMB 5750, PMB 5757 and PMB 5762 (each an "Intel Chip"; collectively, the "Intel Chips").

33. Intel Chips provide cellular connectivity for devices such as Apple iPhones.

34. On information and belief, the PMB 5750 was incorporated into devices including, without limitation, the Apple iPhone 7 and 7 Plus.[1] On information and belief, the PMB 5757 was incorporated into devices including, without limitation, the Apple iPhone 8, 8 Plus and X.[2] On information and belief, the PMB 5762 was incorporated into devices including, without limitation, the Apple iPhone XR, XS and XS Max. [3]

35. On information and belief, in December 2019, Apple acquired Intel's smartphone modem business for $1 billion. https://www.engadget.com/2019/12/02/apple-owns-intel-modem-business/.

THE ASSERTED PATENTS

United States Patent No. 6,049,706

36. On April 11, 2000, the United States Patent and Trademark Office duly and legally issued United States Patent No. 6,049,706 ("the '706 patent") entitled

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[1] *See* Wegner et al., *Apple iPhone 7 Teardown*, TechInsights (Sept. 15, 2016), https://techinsights.com/blog/apple-iphone-7-teardown; *see also* Srivatsan Sridhar, *Apple iPhone 7 and 7 Plus teardown confirms bigger battery, Intel LTE modem in some models and more*, FoneArena (Sept. 16, 2016), https://www.fonearena.com/blog/197580/apple-iphone-7-and-7-plus-teardown-confirms-bigger-battery-intel-lte-modem-in-some-models-and-more.html.

[2] *See* Yang et al., *Apple iPhone X Teardown*, TechInsights (last modified Nov. 8, 2017), https://www.techinsights.com/blog/apple-iphone-x-teardown.

[3] *See iPhone XS and XS Max Teardown*, iFixit (Sept. 21, 2018), *https*://www.ifixit.com/Teardown/iPhone+XS+and+XS+Max+Teardown/113021; *iPhone XR Teardown*, iFixit (Oct. 26, 2018), https://www.ifixit.com/Teardown/iPhone+XR+Teardown/114123.

"Integrated Frequency Translation and Selectivity" to inventor Robert W. Cook et al. A true and correct copy of the '706 patent is attached as Exhibit 1.

37. The '706 patent is presumed valid under 35 U.S.C. §282.

38. ParkerVision owns all rights, title, and interest in the '706 patent.

United States Patent No. 6,580,902

39. On June 17, 2003, the United States Patent and Trademark Office duly and legally issued United States Patent No. 6,580,902 ("the '902 patent") entitled "Frequency Translation Using Optimized Switch Structures" to inventor David F. Sorrells et al. A true and correct copy of the '902 patent is attached as Exhibit 2.

40. The '902 patent is presumed valid under 35 U.S.C. §282.

41. ParkerVision owns all rights, title, and interest in the '902 patent.

United States Patent No. 7,110,444

42. On September 19, 2006, the United States Patent and Trademark Office duly and legally issued United States Patent No. 7,110,444 ("the '444 patent") entitled "Wireless Local Area Network (WLAN) Using Universal Frequency Translation Technology Including Multi-Phase Embodiments and Circuit Implementations" to inventor David F. Sorrells et al. A true and correct copy of the '444 patent is attached as Exhibit 3.

43. The '444 patent is presumed valid under 35 U.S.C. §282.

44. ParkerVision owns all rights, title, and interest in the '444 patent.

United States Patent No. 7,539,474

45. On May 26, 2009, the United States Patent and Trademark Office duly and legally issued United States Patent No. 7,539,474 ("the '474 patent") entitled "DC Offset, Re-Radiation, and I/Q Solutions Using Universal Frequency Translation Technology" to inventor David F. Sorrells et al. A true and correct copy of the '474 patent is attached as Exhibit 4.

46. The '474 patent is presumed valid under 35 U.S.C. §282.

47. ParkerVision owns all rights, title, and interest in the '474 patent.

United States Patent No. 8,588,725

48. On November 19, 2013, the United States Patent and Trademark Office duly and legally issued United States Patent No. 8,588,725 ("the '725 patent") entitled "Apparatus, System, and Method For Down Converting and Up-Converting Electromagnetic Signals" to inventor David F. Sorrells et al. A true and correct copy of the '725 patent is attached as Exhibit 5.

49. The '725 patent is presumed valid under 35 U.S.C. §282.

50. ParkerVision owns all rights, title, and interest in the '725 patent.

United States Patent No. 8,660,513

51. On February 25, 2014, the United States Patent and Trademark Office duly and legally issued United States Patent No. 8,660,513 ("the '513 patent") entitled "Method and System for Down-Converting an Electromagnetic Signal, and Transforms for Same, and Aperture Relationships" to inventor David F. Sorrells et al. A true and correct copy of the '513 patent is attached as Exhibit 6.

52. The '513 patent is presumed valid under 35 U.S.C. §282.

53. ParkerVision owns all rights, title, and interest in the '513 patent.

United States Patent No. 9,246,736

54. On January 26, 2016, the United States Patent and Trademark Office duly and legally issued United States Patent No. 9,246,736 ("the '736 patent") entitled "Method and System for Down-Converting an Electromagnetic Signal" to inventor David F. Sorrells et al. A true and correct copy of the '736 patent is attached as Exhibit 7.

55. The '736 patent is presumed valid under 35 U.S.C. §282.

56. ParkerVision owns all rights, title, and interest in the '736 patent.

United States Patent No. 9,444,673

57. On September 13, 2016, the United States Patent and Trademark Office duly and legally issued United States Patent No. 9,444,673 ("the '673 patent") entitled "Methods and Systems for Down-Converting a Signal Using a Complementary Transistor Structure" to inventor David F. Sorrells et al. A true and correct copy of the '673 patent is attached as Exhibit 8.

58. The '673 patent is presumed valid under 35 U.S.C. §282.

59. ParkerVision owns all rights, title, and interest in the '673 patent.

CLAIMS FOR RELIEF

COUNT I - Infringement of United States Patent No. 6,049,706

60. The allegations set forth above are re-alleged and incorporated by reference as if they were set forth fully here.

61. Intel directly infringes (literally and/or under the doctrine of equivalents) the '706 patent by making, using, selling, offering for sale, and/or importing into the United States products covered by at least claim 1 of the '706 patent.

62. Intel products that infringe one or more claims of the '706 patent include, but are not limited to, the Intel Chips, and any other Intel device that is capable of filtering and down-converting a higher-frequency signal to a lower-frequency signal as claimed in the '706 patent. On information and belief, Intel uses the Intel Chips at least by testing the Intel Chips in the United States.

63. Each Intel Chip is/includes an apparatus for filtering and down-converting (e.g., a higher frequency RF signal to a lower frequency signal). Each Intel Chip includes a frequency translator, comprising a down-convert and delay module to under-sample an input signal (e.g., high frequency RF signal) to produce an input sample of a down-converted image of said input signal, and to delay said input sample. Each Intel Chip also includes a filter, comprising at least a portion of said down-convert and delay module, at least one delay module to delay instances of an output signal, and an adder (e.g., operational amplifier with parallel resistor-capacitor feedback) to combine at least said delayed input sample with at least one of said delayed instances of said output signal to generate an instance of said output signal.

64. The down-convert and delay module under-samples (e.g., at a sample rate below the Nyquist rate) said input signal according to a control signal (e.g., local oscillator (LO) signal), wherein a frequency of said control signal is equal to a frequency

of said input signal plus or minus a frequency of said down-converted image, divided by n, where n represents a harmonic or sub-harmonic of said input signal.

65. ParkerVision has been damaged by the direct infringement of Intel and is suffering and will continue to suffer irreparable harm and damages as a result of this infringement.

COUNT II - Infringement of United States Patent No. 6,580,902

66. The allegations set forth above are re-alleged and incorporated by reference as if they were set forth fully here.

67. Intel directly infringes (literally and/or under the doctrine of equivalents) the '902 patent by making, using, selling, offering for sale, and/or importing into the United States products covered by at least claim 1 of the '902 patent.

68. Intel products that infringe one or more claims of the '902 patent include, but are not limited to, the Intel Chips, and any other Intel device that is capable of down-converting a higher-frequency signal to a lower-frequency signal as claimed in the '902 patent. On information and belief, Intel uses the Intel Chips at least by testing the Intel Chips in the United States.

69. Each Intel Chip is/includes a circuit for down-converting an electromagnetic signal (e.g., high frequency RF signal) to a lower frequency signal. Each Intel Chip includes an energy transfer module having a switch module (e.g., module with one or more transistors) and an energy storage module (e.g., module with one or more capacitors). The energy transfer module of the Intel Chip samples the electromagnetic signal at an energy transfer rate (e.g., LO rate with a 25% duty cycle),

according to an energy transfer signal (e.g., LO signal), to obtain sampled energy. The sampled energy is stored by said energy storage module (e.g., one or more capacitors). A down-converted signal (e.g., baseband signal) is generated from the sampled energy.

70. The energy transfer module of each Intel Chip has transistors coupled together. The transistors have a common first port, a common second port, and a common control port. The electromagnetic signal is accepted at the common first port and the sampled energy is present at the common second port.

71. The common control port accepts the energy transfer signal, which has a control frequency that is substantially equal to said energy transfer rate.

72. Each of the transistors of the Intel Chip has a drain, a source, and a gate. The common first port couples together drains of the transistors, the common second port couples together sources of the transistors, and the common control port couples together gates of the transistors.

73. ParkerVision has been damaged by the direct infringement of Intel and is suffering and will continue to suffer irreparable harm and damages as a result of this infringement.

COUNT III - Infringement of United States Patent No. 7,110,444

74. The allegations set forth above are re-alleged and incorporated by reference as if they were set forth fully here.

75. Intel directly infringes (literally and/or under the doctrine of equivalents) the '444 patent by making, using, selling, offering for sale, and/or importing into the United States products covered by at least claim 2 of the '444 patent.

76. Intel products that infringe one or more claims of the '444 patent include, but are not limited to, the Intel Chips, and any other Intel device that is capable of down-converting a higher-frequency signal to a lower-frequency signal as claimed in the '444 patent. On information and belief, Intel uses the Intel Chips at least by testing the Intel Chips in the United States.

77. Each Intel Chip is/includes a wireless modem apparatus (e.g., a modulation/demodulation device providing bi-directional, over-the-air data transmission) having a receiver for frequency down-converting an input signal (e.g., high frequency RF signal). The receiver for frequency down-converting an input signal includes a first frequency down-conversion module to down-convert the input signal, wherein said first frequency down-conversion module down-converts said input signal according to a first control signal (e.g., LO signal) and outputs a first down-converted signal (e.g., baseband signal); a second frequency down-conversion module to down-convert said input signal, wherein said second frequency down-conversion module down-converts said input signal according to a second control signal (e.g., LO signal) and outputs a second down-converted signal (e.g., baseband signal); and a subtractor module (e.g., module with differential amplifier) that subtracts said second down-converted signal from said first down-converted signal and outputs a down-converted signal.

78. The first frequency down-conversion module under-samples (e.g., at a sample rate below the Nyquist rate) the input signal according to the first control signal, and the second frequency down-conversion module under-samples samples (e.g., at a

sample rate below the Nyquist rate) the input signal according to said second control signal.

79. ParkerVision has been damaged by the direct infringement of Intel, and is suffering and will continue to suffer irreparable harm and damages as a result of this infringement.

COUNT IV - Infringement of United States Patent No. 7,539,474

80. The allegations set forth above are re-alleged and incorporated by reference as if they were set forth fully here.

81. Intel directly infringes (literally and/or under the doctrine of equivalents) the '474 patent by making, using, selling, offering for sale, and/or importing into the United States products covered by at least claim 1 of the '474 patent.

82. Intel products that infringe one or more claims of the '474 patent include, but are not limited to, the Intel Chips, and any other Intel device that is capable of down-converting a higher-frequency signal to a lower-frequency signal as claimed in the '474 patent. On information and belief, Intel uses the Intel Chips at least by testing the Intel Chips in the United States.

83. Each Intel Chip is/includes an apparatus for down-converting an input signal (e.g., high frequency RF signal) to a lower frequency signal. Each Intel Chip includes a first frequency down-conversion module that receives an input signal (e.g., high frequency RF signal), wherein the first frequency down-conversion module down-converts the input signal according to a first control signal (e.g., LO signal) and outputs a first down-converted signal (e.g., baseband signal); a second frequency down-

conversion module that receives the input signal, wherein the second frequency down-conversion module down-converts the input signal according to a second control signal (e.g., LO signal) and outputs a second down-converted signal (e.g., baseband signal); and a combining module (e.g., module with a differential amplifier) that combines the second down-converted signal with the first down-converted signal and outputs a single channel down-converted signal.

84. The first frequency down-conversion module of each Intel Chip includes a first switch (e.g., transistor) and a first storage element (e.g., one or more capacitors), wherein the first switch is coupled to the first storage element at a first node (e.g., port) and coupled to a first reference potential (e.g., ground).

85. The second frequency down-conversion module of each Intel Chip includes a second switch (e.g., transistor) and a second storage element (e.g., one or more capacitors), wherein the second switch is coupled to the second storage element at a second node (e.g., port) and coupled to a second reference potential (e.g., ground).

86. ParkerVision has been damaged by the direct infringement of Intel, and is suffering and will continue to suffer irreparable harm and damages as a result of this infringement.

COUNT V - Infringement of United States Patent No. 8,588,725

87. The allegations set forth above are re-alleged and incorporated by reference as if they were set forth fully here.

88. Intel directly infringes (literally and/or under the doctrine of equivalents) the '725 patent by making, using, selling, offering for sale, and/or importing into the United States products covered by at least claim 1 of the '725 patent.

89. Intel products that infringe one or more claims of the '725 patent include, but are not limited to, the Intel Chips and any other Intel device that is capable of down-converting a higher-frequency signal to a lower-frequency signal as claimed in the '725 patent. On information and belief, Intel uses the Intel Chips at least by testing the Intel Chips in the United States.

90. Each Intel Chip is/includes an apparatus for down-converting an electromagnetic signal (e.g., high frequency RF signal) to a lower frequency signal. Each Intel Chip has an aliasing module comprising a switching device (e.g., transistor) and a storage module (e.g., capacitor). The aliasing module receives as an input an RF information signal and provides as an output a down-converted signal. The switching device of the aliasing module receives as an input a control signal (e.g., LO signal) that controls a charging and discharging cycle of the storage module by controlling the switching device so that a portion of energy is transferred from the RF information signal to the storage module during a charging part of the cycle and a portion of the transferred energy is discharged during a discharging part of the cycle.

91. The control signal operates at an aliasing rate (e.g., LO rate with a 25% duty cycle) selected so that energy of the RF information signal is sampled and applied to the storage module at a frequency that is equal to or less than twice the frequency of the RF information signal. The storage module generates the down-converted signal

from the alternate charging and discharging applied to the storage module using the control signal.

92. ParkerVision has been damaged by the direct infringement of Intel, and is suffering and will continue to suffer irreparable harm and damages as a result of this infringement.

COUNT VI - Infringement of United States Patent No. 8,660,513

93. The allegations set forth above are re-alleged and incorporated by reference as if they were set forth fully here.

94. Intel directly infringes (literally and/or under the doctrine of equivalents) the '513 patent by making, using, selling, offering for sale, and/or importing into the United States products covered by at least claim 19 of the '513 patent.

95. Intel products that infringe one or more claims of the '513 patent include, but are not limited to, the Intel Chips and any other Intel device that is capable of down-converting a higher-frequency signal to a lower-frequency signal as claimed in the '513 patent. On information and belief, Intel uses the Intel Chips at least by testing the Intel Chips in the United States.

96. Each Intel Chip is/includes a system for frequency down-converting a modulated carrier signal (e.g., a high frequency RF signal) to a lower frequency signal. Each Intel Chip has (a) a first switch (e.g., transistor), (b) a first control signal (e.g., LO signal) which comprises a sampling aperture (e.g., 25% duty cycle) with a specified frequency, and (c) a first energy storage element (e.g., one or more capacitors) that

down-converts the modulated carrier signal according to the first control signal and outputs a down-converted in-phase signal portion of the modulated carrier signal.

97. Each Intel Chip has (a) a second switch (e.g., transistor), (b) a second control signal (e.g., LO signal) which comprises a sampling aperture (e.g., 25% duty cycle) with a specified frequency, and (c) a second energy storage element (e.g., one or more capacitors) that down-converts the modulated carrier signal according to the second control signal and outputs a down-converted inverted in-phase signal portion of the modulated carrier signal.

98. Each Intel Chip has a first differential amplifier circuit that combines the down-converted in-phase signal portion with the inverted in-phase signal portion and outputs a first channel down-converted differential in-phase signal.

99. Each Intel Chip has (a) a third switch (e.g., transistor), (b) a third control signal (e.g., LO signal) which comprises a sampling aperture (e.g., 25% duty cycle) with a specified frequency, and (c) a third energy storage element (e.g., one or more capacitors) that down-converts the modulated carrier signal according to the third control signal and outputs a down-converted quadrature-phase signal portion of the modulated carrier signal.

100. Each Intel Chip has (a) a fourth switch (e.g., transistor), (b) a fourth aperture signal (e.g., LO signal), and (c) a fourth energy storage element (e.g., one or more capacitors) that down-converts the modulated carrier signal according to the fourth control signal and outputs a down-converted inverted quadrature-phase signal portion of the modulated carrier signal.

101. Each Intel Chip has a second differential amplifier circuit that combines the down-converted quadrature-phase signal portion with the inverted quadrature-phase signal portion and outputs a second channel down-converted differential quadrature-phase signal.

102. ParkerVision has been damaged by the direct infringement of Intel, and is suffering and will continue to suffer irreparable harm and damages as a result of this infringement.

COUNT VII - Infringement of United States Patent No. 9,246,736

103. The allegations set forth above are re-alleged and incorporated by reference as if they were set forth fully here.

104. Intel directly infringes (literally and/or under the doctrine of equivalents) the '736 patent by making, using, selling, offering for sale, and/or importing into the United States products covered by at least claim 1 of the '736 patent.

105. Intel products that infringe one or more claims of the '736 patent include, but are not limited to, the Intel Chips and any other Intel device that is capable of down-converting a higher-frequency signal to a lower-frequency signal as claimed in the '736 patent. On information and belief, Intel uses the Intel Chips at least by testing the Intel Chips in the United States.

106. Each Intel Chip is/includes a system for frequency down-converting a modulated carrier signal (e.g., high frequency RF signal) to a demodulated baseband signal. Each Intel Chip has a first switch (e.g., transistor) coupled to a first control signal (e.g., LO signal) which comprises a first sampling aperture (e.g., 25% duty cycle) with a

specified frequency, wherein the first switch is on during the first sampling aperture and wherein the first switch is off outside the first sampling aperture.

107. Each Intel Chip has a first energy storage element (e.g., one or more capacitors), coupled to said first switch, that outputs a down-converted in-phase baseband signal portion of the modulated carrier signal.

108. Each Intel Chip has a second switch (e.g., transistor) coupled to a second control signal (e.g., LO signal) which comprises a second sampling aperture (25% duty cycle) with a specified frequency, wherein the second switch is on during the second sampling aperture and wherein the first switch is off outside the second sampling aperture.

109. Each Intel Chip has a second energy storage element (e.g., one or more capacitors), coupled to the second switch, that outputs a down-converted inverted in-phase baseband signal portion of the modulated carrier signal.

110. The first and second control signals each control a charging and discharging cycle of their respective energy storage element so that for each switch a portion of energy from the modulated carrier signal is transferred to the respective energy storage element when the respective switch is on during the charging cycle, and a portion of previously transferred energy is discharged during the discharging cycle for each respective switch when the respective switch is off.

111. For each respective energy storage element, the energy discharged during any given discharge cycle is not completely discharged, with the remaining

undischarged energy from the given discharge cycle becoming an initial condition for a next charging cycle that begins immediately following the given discharge cycle.

112. The down-converted in-phase baseband signal portion is derived from energy accumulated at the first energy storage element during both the charging and the discharging cycles for the first energy storage element. The down-converted inverted in-phase baseband signal portion is derived from energy accumulated at the second energy storage element during both the charging and the discharging cycles for the second energy storage element.

113. Each Intel Chip has a first differential amplifier circuit that combines the down-converted in-phase baseband signal portion with the down-converted inverted in-phase baseband signal portion and outputs a first channel down-converted differential in-phase baseband signal.

114. ParkerVision has been damaged by the direct infringement of Intel, and is suffering and will continue to suffer irreparable harm and damages as a result of this infringement.

COUNT VIII - Infringement of United States Patent No. 9,444,673

115. The allegations set forth above are re-alleged and incorporated by reference as if they were set forth fully here.

116. Intel directly infringes (literally and/or under the doctrine of equivalents) the '673 patent by making, using, selling, offering for sale, and/or importing into the United States products covered by at least claim 1 of the '673 patent.

117. Intel products that infringe one or more claims of the '673 patent include, but are not limited to, the Intel Chips and any other Intel device that is capable of down-converting a higher-frequency signal to a lower-frequency signal as claimed in the '673 patent. On information and belief, Intel uses the Intel Chips at least by testing the Intel Chips in the United States.

118. Each Intel Chip is/includes an apparatus for down-converting an input modulated carrier signal (e.g., high frequency RF signal) to a demodulated baseband signal, wherein the modulated carrier signal has an amplitude variation, a phase variation, a frequency variation, or a combination thereof.

119. Each Intel Chip has a frequency down-conversion module that has a switch (e.g., transistor), a capacitor coupled to said switch, and a pulse generator (e.g., LO) coupled to the switch. The pulse generator outputs pulses to the switch at a rate (e.g., LO rate with a 25% duty cycle) that is a function of a frequency of the modulated carrier signal and a frequency of the demodulated baseband signal determined according to: (the frequency of the modulated carrier signal +/− a frequency of the demodulated baseband signal) divided by N, where N is any integer including 1.

120. The pulses have apertures and the pulses cause the switch to open outside of the apertures and cause the switch to close and sample the modulated carrier signal during the apertures by transferring energy from the modulated carrier signal and accumulating the transferred energy in the capacitor each time the switch is closed.

121. Some of the previously accumulated energy is discharged from the capacitor into load circuitry (e.g., a differential amplifier) each time said switch is open.

The demodulated baseband signal is generated from (a) the accumulating of the energy transferred to the capacitor each time the switch is closed and (b) the discharging of the some of the previously accumulated energy into the load circuitry each time the switch is opened.

122. ParkerVision has been damaged by the direct infringement of Intel, and is suffering and will continue to suffer irreparable harm and damages as a result of this infringement.

JURY DEMANDED

Pursuant to Rule 38(b) of the Federal Rules of Civil Procedure, ParkerVision hereby requests a trial by jury on all issues so triable.

PRAYER FOR RELIEF

WHEREFORE, ParkerVision respectfully requests that the Court enter judgment in its favor and against Intel as follows:

a. finding that Intel directly infringes one or more claims of each of the patents-in-suit;

b. awarding ParkerVision damages under 35 U.S.C. § 284, or otherwise permitted by law, including supplemental damages for any continued post-verdict infringement;

c. awarding ParkerVision pre-judgment and post-judgment interest on the damages award and costs;

d. awarding cost of this action (including all disbursements) and attorney fees pursuant to 35 U.S.C. § 285, or as otherwise permitted by the law; and

e. awarding such other costs and further relief that the Court determines to be just and equitable.

Dated: February 11, 2020

Respectfully submitted,

/s/Raymond W. Mort, III

Raymond W. Mort, III
Texas State Bar No. 00791308
raymort@austinlaw.com

THE MORT LAW FIRM, PLLC
100 Congress Avenue, Suite 2000
Austin, Texas 78701
Tel/Fax: 512-865-7950

OF COUNSEL:

Ronald M. Daignault*
Chandran Iyer*
Jason Charkow*
Stephanie Mandir *
GOLDBERG SEGALLA
rdaignault@goldbergsegalla.com
ciyer@goldbergsegalla.com
jcharkow@goldbergsegalla.com
smandir@goldbergsegalla.com
711 Third Avenue, Suite 1900
New York, New York 10017
Telephone: (646) 292-8700

Attorneys for Plaintiff ParkerVision, Inc.

* *pro hac vice* motion to be filed